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Submission By Air Future & Air Volution Limited

To

Energy Innovation (Electric Vehicles and Other Matters)
Amendment Bill 2016: Bills Digest No 2407

CONTENTS

This Submission
Our Products
Local Production
New Zealand
References & Links

THIS SUBMISSION

1. Executive Summary
2. Who We Are
3. Government Objectives
4. This Submission
5. Government Benefits
6. Industry Barriers Overcome

Our PRODUCTS

7. The Technology
8. Our Vehicles & Energy Products
9. Differentiation

LOCAL PRODUCTION

10. Commercialisation & Industrialisation
11. Local Manufacture & Employment
12. Specifications & Perspective

NEW ZEALAND

13. New Zealand Region
14. Our Expectations & Support

REFERENCES & LINKS

THIS SUBMISSION

1. Executive Summary

Air Future Limited & its subsidiary Air Volution Limited hold the exclusive licensed Australasian rights to technology that utilises **air** as an energy store and application, including a range of **emissions free vehicles** and **energy storage systems**.

This technology is **mechanically and thermodynamically innovative**.

Vehicles are **completely pollution free, with cold exhaust**.

A vehicle on dual mode can travel **2000km on 1 tank, and recharge with electricity in a moment**.

The technology can also provide **affordable energy to remote locations**, with **negligible maintenance**.

Opportunity for **local manufacture**.

We seek classification as electric and clean emission vehicles.

2. Who We Are

Air Future Limited & its subsidiary Air Volution Limited hold the exclusive licence Australasian rights for the technology and products of MDI in France, and intend to commercialise them in New Zealand.

MDI is a world leader in the technology of utilising air as energy store and application, and are industrialising it via a range of emissions free vehicles and energy storage systems.

After twenty years of development MDI has joint ventures and alliances with some of the most powerful companies in the world, who themselves seek to industrialise the technology.

Australasia and specifically New Zealand has the early global opportunity to demonstrate and implement transport and energy products that are affordable for the masses, emission free, highly efficient, a delight to use, and completely scalable.

By scalable this means get larger without disadvantage, so hence it can be seen that the solutions offered have great scope. They span vehicles from small to large, and from consumer to commercial to industrial. They span from home energy storage to buildings and communities to factories.

They include mass utility storage to overcome the intermittency and storage weakness in renewable energy utility generation.

And the base energy source is electricity, hence the electric classification, though the energy source can go beyond that and also use all forms of renewable energy via a hybrid mode. We see the New Zealand Government, people and businesses having enormous benefits; but without many of the debilitating economic costs of subsidies and inefficiencies we observe in the current renewable energy transition around the globe.

3. Government Objectives

We understand that the Bill to which this submission refers is an omnibus bill affecting Energy, Land Transport, and Road User Charges. We also understand that the broad policy of this bill is to encourage energy innovation, such as emerging energy technologies and increased variation in energy-related business models, so that New Zealand has the ability to respond to its environmental and energy objectives. We appreciate the increased focus on improving the efficiency of New Zealand energy use and their climate change commitments requires a greater focus on transport energy and process heat. In addition the EECA is the Crown entity that works to encourage, promote, and support energy efficiency, energy conservation, and the use of renewable energy.

What is paramount in our observation within Australasia and globally is that the efforts of Governments to create a renewable lifestyle are meeting big economic costs due to subsidies, inefficiencies, and outages. In both our transport and energy products we do not have any such shortcomings. Their economic usage as well as the products themselves are completely innovative, and to the Government they represent low risk and high benefits.

4. This Submission

This submission, related to our technology and products, is at a very high level and as a brief serves only as an introduction. We include references or links to add further introduction. We then hope to be able to engage to jointly consider more the role in the community for the many applications, and the interest of the Government in our products.

Our primary aim with this submission is that the Government is aware of us, and that we are being considered alongside and in parallel to other products, whether vehicles or energy.

In doing so we seek to tick the boxes that assure we are not overlooked. As can be seen herein we have innovative technology which might require broader thought, but we also have traditional aspects for which we already fall within categories familiar to all.

For example our vehicles can be classified as electric, as they charge via electricity. Instead of charging a battery the vehicle fills the air in the tank. Both provide storage and drive the vehicle. Our proposition is that we have many benefits, but at very least should be considered in parallel.

Hence we would be subject to the same concessions as what is more narrowly categorised as electric vehicles, but could be more broadly categorised as emission free vehicles.

The same applies for energy systems, an example being our enormous opportunity for combining storage and power generation. Examples might be combining solar at homes or buildings, or wind at utility level generation. Batteries, familiar to all as storage devices, still have technological, price, scale, duration, and disposal considerations. Air storage has none of these considerations, and many additional benefits. There is room for all solutions competing to the customer benefit, and the environment benefits.

5. Government Benefits

We observe globally, somewhat outspokenly, that existing commercial interests in the renewable energy transition can blinker the vision to innovation. Globally and publically, investors in the know are quoted as advocating more innovation is necessity, especially in identified areas, for example energy storage. But the proportion of dollars allocated lag those recommendations. A classic scenario is expenditure on traditional wind and solar generation in line with expenditure on battery storage. For these integrated systems, both a distributed consumer level as well as mass utility level, affordability and efficiency are not generating the desired Government or user economics. In effect, observations globally show it's still the converse.

In addition, whereas the approaches to the above include subsidies at the sales end plus the need for mass economies of scale at the input end, both of those are not secure economic drivers. What is needed is technology that does not require either of those. It stands on its own two feet.

We have that technology for all aspects of our vehicles and their transport infrastructure, as well as for the related energy systems. Together those span Government, industrial, commercial, consumer, and community alike.

6. Industry Barriers Overcome

The industry will struggle as long as the economics is overruled by the social ethics (climate), health (pollution), and politics (direction). What is needed is for the economics to prevail. Whilst that is difficult during transition, innovation can do it. Our technology seeks to do exactly that,

enabled progressively via identified energy sectors and vehicle applications, moving forward onto mass energy, infrastructure and economic application.

And it is the result of two decades of development, for which we are seeking commercialisation in New Zealand, just as it is taking place initially in Europe, India, and China.

OUR PRODUCTS

7. The Technology

At the core of the technology MDI have designed and created a multiple operating version of an engine that runs on stored compressed air. The system both stores air via compression into a tank, plus creates output energy such as applications via vehicles or electricity generation. Paramount is the air storage. So one might compare that to say a battery. And basically to initially charge the air tank one plugs into the electricity. So again one might compare to say a battery and an electric vehicle.

But that's where the comparisons stop. The air engines in their class are the most efficient ever designed. The key to that is not the compression so much as the expansion. There is nothing the same in the air engine to the traditional combustion engine. Mechanically and thermodynamically it is completely innovative.

As well as using air, MDI vehicles and energy systems can use a hybrid of air and any form or renewable energy. The reason is that it uses external combustion at 600 degrees rather than the traditional 2,000 degrees internal combustion. Completely pollution free. We have factors such as flat torque curve and cold exhaust. A vehicle running in what we call dual energy mode can travel 2,000kms on one traditional tank, and recharge a tank with electricity in a moment. The system can elect to drive the vehicle plus top up the tank simultaneously. Or it can apply all the energy to the vehicle to create outperformance.

MDI has a complete suit of global patents, but it is the extent to which parties like Tata Motors in India, Veolia in France, KLM in Netherlands, and countries like China and India are involved that speaks for the opportunities that can reflect for an early adopter like New Zealand.

8. Our Vehicles & Energy Products

Whilst the above technology is at the core of products and applications, MDI has designed such applications holistically from the ground up. For example vehicles use composite materials like those used in exotic cars, light weight, integrated design of all componentry and wiring and most critically, low manufacturing cost.

The design of production is so innovative that MDI vehicles can be produced very economically by smaller distributed factories. No more huge capital outlay, huge land, and risky break-even volume. Plus a variable factory production model suited to any stage of a market's development. And you can both expand and contract. And you can do so in the same location or different. Employment and resources are local, whilst still accessing centralised supply and overseas componentry for around 20%, but only when justified.

The vehicle range is progressive, spanning from small to very large. At the small end is the AirPod, and small commercial and consumer options of it. It is certified for on road in Europe as a quadracycle category L7e, and is available everywhere commercially off road. We hope New Zealand will consider similar categorisation to Europe, and in the meantime we will export to MDI's many existing and growing customers. Next we have the larger more standard vehicles being the AirOne and AirCity. We also have a truck model, currently certified by Veolia in France. These are all 2017 production targets, hopefully including factory production time which is not long.

Thereafter MDI is progressing a continuing range of vehicles and transport, from family to commercial to industrial to marine. Other applications are innumerable; an early example is street lighting. In all cases completely emission free, affordable, and scalable.

Many pundits in renewable energy propose that whilst renewable energy in transport is big, in electricity it will be huge. MDI energy storage and electricity generation systems have application ranging completely across the spectrum - from centralised to distributed. That means from consumer to commercial to industrial, including utility. Home energy is our first focus along with stand alone generation.

MDI energy systems work extremely well with all forms of energy. So solar and wind are obvious examples, with solar in homes and remote initially on the forefront of consumers minds. But MDI systems can also work with biomass or other energy systems due to the different heat design. Heat and air work well together thermodynamically. For some of us we see a dream of providing affordable energy to remote locations, requiring negligible maintenance. With energy efficiencies, price, and system independence this is not a hollow dream.

To give the reader a view of the scalability and affordability of the technology, we demonstrate the scope of current developments from small 7kw home energy off grid potential to a mass underground compressed air storage system, the latter currently in advanced development with MDI and major corporate and oil interests.

9. Differentiation

Renewable energy generation is based on nature. Nature is intermittent. Therefore it is inefficient. To overcome this one needs storage. Energy storage is very hard to do. Traditional storage is very capital expensive, or very operationally unaffordable, or not particularly clean or has disposal, duration, or risk elements. There is often lack of modularity or scale. So hydro and nuclear, are mass examples. And batteries are non mass examples.

The renewable energy generation is becoming more efficient by the day. But not so storage. The pace is changing slowly. Historically batteries for example have improved slowly technologically. Raw material supply is also a risk. Disposal is a hazard. They can be a fire risk. Not clean to produce. And they are relying on mass production scale for economics, which is not a sound economic parameter.

Simply put, the MDI storage technology has none of these inhibitors. It is affordable. The technology is modular and scalable, and the manufacture is also modular and scalable. It is clean to produce. Does not have the duration or disposal issues. It has far broader and more pervasive applications. The differentiations are innumerable. It is a next stage technological commercialisation.

Of course in these cases by definition the mass industry is yet to become familiar as traction is gained and publicity takes off. That has started, with some of the largest corporations and countries moving to adoption. For New Zealand to do likewise on their behalf requires no costs, no individual subsidies, and no risks; but much upside.

LOCAL PRODUCTION

10. Commercialisation & Industrialisation

It is always essential to understand a technology's stage. We refer to four stages: development, industrialisation, commercialisation, and penetration. MDI has completed its technology development over two decades. It will continue to advance on it. Those advances are aided by some joint ventures with top global corporations.

We describe MDI as now having entered into the industrialisation stage, and now commercialising. They have readied themselves re' design, manufacture and industrialisation, and have commenced on commercialisation via select licence parties. We are a foundation with MDI, with many rights and privileges in the relationship spanning over a decade. Other privileged parties include their huge joint venture development partners, also entering into their own industrialisation of the MDI technology.

The mass global commercialisation stage is early, which is great for us as we have many rights, but especially re' Australasia and specifically New Zealand. There are already licences being developed alongside ours with factory production. So we are not the first, which is good, though early, which is also good. MDI is currently focused on few but valued relationships.

11. Local Manufacture & Employment

This submission earlier on referred to the new MDI concept enabling distributed manufacture tailored to regions and market size by products. This is extremely attractive not only for us but for communities.

We would hope to explore, along with the New Zealand Government, how we can progress this not only for local manufacture and customers but also for export to Pacific Islands; and potentially further afoot to Europe where MDI needs to fill its existing demand. Under its industrial model it does not seek to provide direct product itself.

12. Specifications & Perspective

Technology is a complex business, and this has only been an umbrella view; whereupon we then hope to engage and explain and explore more to develop the NZ Government's desires. Suffice to say the scope of materials is immense, ranging from absolute specifications to relative comparisons. Enjoyably there is also a raft of user friendly brochures, podcasts and videos, credibility proofs, and whatever a reader may want. Some elect to visit the French MDI company operations.

An example of these documents is a favourable French Government decree relating to their Environmental Code and Highway Code defining the criteria characterising the MDI vehicles in the "low and very low emission levels" for less than 3.5 tonnes vehicles. Whilst this had been an obvious conclusion, it was none the less always good to formalise, and we hope for the same in New Zealand re classifications re emission or electric vehicles.

It would be a great disappointment to us if anywhere we have a great product for the community, but for a commercial or political pressure we didn't gain eligibility to the same privileges, under the community spirit in which they are provided. That is unlikely, but we are none the less conscious of it.

NEW ZEALAND

13. New Zealand Region

Air Future Limited is a New Zealand based public investment company. It is the majority shareholder in regional MDI licences. These it will

commercialise for both the MDI transport and energy via two specialist operational companies registered in Australia, but operating broadly or locally. These are Air Volution Limited and Air To Energy Limited. These companies are lead by specialised Chief Executive and Chief Operations Officers. They have been hand selected giving the nature of the business and its manufacturing and technology thrust. They have broad Australasian responsibilities including New Zealand.

Locally the parent Air Future limited is headed up by two New Zealand residents who operate out of Christchurch. There is flexibility in group structure to enable us to operate most suitably in cooperation with the New Zealand Government to achieve their renewable energy transport and electricity objectives.

14. Our Expectations & Support

This submission, under the invitation from the Government and authorities, serves only as an introduction. We hope it will enable us to have an active engagement to further the Government's understanding of our capabilities, and to further ours in how we might assist their objectives.

We don't require special privileges but hope to receive them similarly to others. We hope the Government will understand our classification as electric and clean emissions vehicles, even though our technology is innovative.

We also hope the Government will see the scope of ways to progress the community in the renewable energy industry. Like computing and Cloud, there is a huge opportunity in distributed energy storage, and grid and intra-grid sharing versus simply remote or off grid.

Also there are emission free vehicle categories throughout Europe and Asia and other parts of the world where there are many community benefits. We hope the Government will give consideration to the range of these for New Zealand. Renewable energy aside, in the transport arena one only has to look across scooters, motorcycles, street bicycles, heavy trucks and buses, to see the scope of what the legislation covers. On a similar vein the L7e quadracycle might provide another good mode of clean affordable transport as they do in Europe. And they have huge commercial and gated community applications as well.

With congested cities, parking and traffic, taxis and Uber, GoGet, car hire, and areas yet unthought of, the MDI smaller range can be a great addition to city and suburban traffic and infrastructure savings. And totally clean.

We would like to take this opportunity to compliment the Government on the work and initiatives they are undertaking in this field, and especially for the opportunity to make this submission.

REFERENCES & LINKS

1) Relevant Company Web sites:

Air Future Limited - <http://www.airfuture.co.nz/>

Air Volution Limited - <http://www.air-volution.com.au/>

MDI - <http://www.mdi.lu/>

2) Supportive Information: <http://www.airfuture.co.nz/brochure.htm>

United Nations Presentation link

http://media.wix.com/ugd/3017b1_aa5c208049d2414fb89daecb9a81e1ba.pdf

Vehicle Range (AirPod)

<http://airfuture.000a.biz/MDI%20AirPod%20Range.pdf>

MDI Product Range Brochure

<http://airfuture.000a.biz/BROCHURE%20CORPORATE%20MDI%20ENGLISH%20VERSION.pdf?i=1>

3) French Government Low emission vehicle decree:

Decree No. 2017-24 of 11 January 2017 issued in application of Articles L. 224-7 of the Environmental Code and L. 318-1 of the Highway Code defines the criteria characterizing the vehicles at low and very low emission levels of less than 3.5 tonnes

[Décret n° 2017-24 du 11 janvier 2017 pris pour l'application des articles L. 224-7 du code de l'environnement et L. 318-1 du code de la route définissant les critères caractérisant les véhicules à faibles et très faibles niveaux d'émissions de moins de 3,5 tonnes]

<https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000033857529&categorieLien=id>